

Missouri Resources

Fall 2014 • Volume 31 • Number 4



 **40
years**

Missouri Department of Natural Resources

director's comment

I'm reminded that change is a core element of life each fall as the stunning palette of colors reveals itself on Missouri's hillsides. We all enjoy the brilliant yellow and bold red leaves displayed by the maple and oak trees. However, I also appreciate the deep browns and muted burnt sienna that frames the landscape far in the distance. It takes those deeper more muted shades working in harmony to create the middle tint of autumn's scenery—allowing the brilliant colors to shine even brighter.

The Missouri Department of Natural Resources has been taking care of Missouri's natural resources on a daily basis for the past 40 years. Much like fall's scenery – there have been many changes during the years. Some changes have been subtle while others have been stark improvements. As we reflect on the progress made, I realize it's those subtle changes that have been creating the middle tint of Missouri's environmental canvas. Today our landscapes, countrysides and metropolitan areas are shining brighter thanks to cleaner air, land and water.

Still there is much work to do and future natural resource challenges that await us. To help focus

on these future challenges, the department is hosting a Governor's Conference on Natural Resources in November. The department will engage its many stakeholders and partners during the conference to explore our legacy, identify future challenges and prioritize opportunities to chart the future of Missouri's natural resources.

The future of Missouri's natural resources depends on the efforts of every community, business, organization, farmer and private citizen. The department will present the Natural Resources Awards of Excellence during the conference to recognize those whose leadership and innovations have helped protect our state's natural resources. Learn more about these awards in the DNR News section of this issue.

The department's MissouriDNR40 Photo Contest ended on Aug. 1. We received nearly 250 photo entries that capture the essence of Mis-



souri's rich natural and cultural resources. The winners will be featured in the winter issue of Missouri Resources. Learn more about the department's 40th anniversary at dnr.mo.gov/40.

Together, we can help make Missouri an even better place to live, work and enjoy the outdoors.

Sara Parker Pauley
Missouri Department of Natural Resources

Missouri Resources

Fall 2014
Volume 31 • Number 4

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Mission Statement

The mission of the Missouri Department of Natural Resources is to protect, preserve and enhance Missouri's natural, cultural and energy resources.

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MISSOURI RESOURCES is published quarterly by the Missouri Department of Natural Resources to inform readers about important natural resource issues and how they are being addressed. Any correspondence should be directed to the editor at the Department of Natural Resources, Publications, PO Box 176, Jefferson City, MO 65102-0176, or call 800-361-4827. Email address: moresdnr@dnr.mo.gov. MoDNR home page: dnr.mo.gov. To subscribe or unsubscribe online: dnr.mo.gov/magazine/subscription.htm.



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Missouri Resources is printed with soy ink on recycled paper at Walsworth Publishing Co., Marceline, Mo



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by *Steph Deidrick*

In 2013, participants in the Governor's 100 Missouri Miles Challenge logged enough miles to circle the Earth 46 times – that's 1.2 million miles! In 2014, the challenge includes new conversions for turning more of your activities into qualifying miles.

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by *Justin Davis*

The Missouri Geological Survey's educational water well doesn't just explain what goes on below the surface of a drinking water well – it *shows* you. A clear PVC well casing and "down-hole camera" offer an up-close look at our groundwater resources – and why we work to protect them.

14 The Year of the Trail

by *Megan Hopkins*

Voted "Best Trails State" in 2013, Missouri is celebrating 2014 as "The Year of the Trail." With nearly 1,000 miles of trails in 85 state parks and historic sites, more are added each year for hiking, biking, paddling, horseback riding and all-terrain use.

departments

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Above: The Spring Trail at Ha Ha Tonka State Park offers spectacular views of fall foliage. *DNR photo by Scott Myers.*

Front Cover: An MKT Railroad logo on a limestone bluff a short walk east of Rocheport testifies to the Katy Trail's railroad history. *DNR photo by Scott Myers.*

Back Cover: Three dining rooms at the J. Huston Tavern in Arrow Rock provide a bright, comfortable setting to enjoy the restaurant's famous fried chicken. *DNR photo by Andrew Richmond.*



(Top) Special Olympians join Gov. Jay Nixon in cutting a 100 Missouri Miles ribbon at Trail of Tears State Park near Cape Girardeau.

Cyclists pass through Tebbetts, in southern Callaway County, on Katy Trail State Park, the most popular trail in Missouri to log miles on in 2013. The logo in the upper left corner is the e-badge for Crowder State Park – one of 14 e-badges created for several state parks and historic sites in the 2014 challenge. See the top of page six for details.

DNR photo by Scott Myers



LOG 100 MISSOURI MILES IN 2014

by Steph Diedrick

A crowd joined Gov. Jay Nixon and First Lady Georganne Nixon in March at Rock Bridge Memorial State Park in Columbia to launch the second year of the Governor's 100 Missouri Miles Challenge. Participants of all ages then hiked their first mile on the Spring Brook Trail.

The 100 Missouri Miles Challenge encourages Missourians to complete "100 Missouri Miles" of physical activity by walking, running, biking, rolling, paddling or hiking throughout Missouri, including in Missouri's state parks and historic sites.

The idea for the challenge started in 2013, when Missouri was named the Best Trails State in the nation by American Trails, a national, nonprofit organization working on behalf of the nation's hiking, biking and riding trails. The national award is presented every two years to the state that has made tremendous contributions to promote and improve their trails system.

"After being recognized as the Best Trails State in the nation last year, the first lady and I launched the 100 Missouri Miles Challenge to encourage folks to enjoy the

(Below) Park interpreter Kathie Brennan leads a hike on Sheppard Point Trail in Trail of Tears State Park.



DNR photo by Tom Uhlenbrock



tremendous outdoor opportunities the Show-Me State has to offer,” Gov. Nixon said. “This year, we’re again inviting Missourians to get out and get active with their families and friends and make the 100 Missouri Miles Challenge part of a healthy, active lifestyle in 2014.”

MORE THAN A MILLION MILES LOGGED

In 2013, Missourians taking the Governor’s 100 Missouri Miles Challenge walked, hiked, rode and rolled enough miles to circle the Earth 46 times.

“Thirteen-thousand people walked 1.2

(Left) Anglers enjoying premier fishing at Montauk State Park near Salem also can log miles hiking on the park’s trails.

(Below) The Finger Lakes State Park Water Trail near Columbia allows paddlers to earn up to 4.5 miles on the water. The featured e-badge is for Long Branch State Park.





million miles,” said Gov. Nixon. “That’s kind of inspirational.”

In addition to the opportunity to experience the beauty of the outdoors in the state, many participants were motivated by the physical and mental benefits of hitting the trails across the state.

“One of our goals in Missouri State Parks is to get more people outdoors, and we know that trails are like a free tonic for the mind, body and soul,” said Bill Bryan, director of Missouri State Parks. “The Governor’s 100 Missouri Miles Challenge reinforces the important message that spending time on a trail is great for physical and mental health.”

The huge success of the program was not only measurable in the number of miles logged, but also in the enthusiastic participation from Missourians on social media. Facebook, Twitter and Instagram users took to their keyboards and touchpads to share photos and experiences on Missouri’s trails.



(Above left) Along Harpst Trail in Weston Bend State Park in Weston, guests can learn about birds common to the park while adding .7 miles to their total. **(Above)** A hiking or mountain biking adventure on the Kelley Branch Mountain Bike Trail in Finger Lakes State Park takes guests through the 90-acre Kelley Branch Restoration Area. Ha Ha Tonka State Park’s e-badge is shown at the bottom.

A clear stream and sandstone bluffs make Pickle Creek Trail at Hawn State Park, in Ste. Genevieve County, a beautiful place to rack up miles any time of the year. Elephant Rocks State Park's e-badge is featured at the bottom of the photo.

DNR photo by Scott Myers



“A great thing about this program is, by joining, one becomes part of an active community of people who love the outdoors.”

— First Lady Georganne Nixon

LOG MILES, EARN BADGES

In 2014, the campaign once again challenges Missourians to hit the trails and enjoy the great outdoors. Participants can log onto 100MissouriMiles.com to track their mileage. The website also converts other outdoor activities into mileage; aerobics, Frisbee and yoga are among the activities on the list.

An addition to this year's challenge is the opportunity to earn a series of e-badges. As users log miles, new icons will appear in their "Trophy Room." Badges can be earned for mileage and specific activities, as well as for logging miles at specific state parks. The parks include Dr. Edmund A. Babler Memorial, Elephant Rocks, Ha Ha Tonka, Johnson's Shut-Ins, Katy Trail, Long Branch, Rock Bridge Memorial, Route 66, Trail of Tears and Watkins Mill state parks. Many historic sites also have trails for guests to enjoy and add to their mileage. History buffs can unlock the Civil War history badge by logging miles at Battle of Athens, Battle of Lexington, Fort Davidson and Battle of Island Mound state historic sites.

GROUPS TAKE ON THE CHALLENGE

Returning in 2014 is the Groups feature, which allows individuals to join friends and coworkers to track their mileage as a team. Businesses, educational organizations and groups of friends have already signed on to take the challenge together.

"A great thing about this program is, by joining, one becomes part of an active community of people who love the outdoors," said First Lady Nixon.

Through the Group Directory online, users can join an existing group or create their own. Those



(Left) Whispering Pines Trail in Hawn State Park is a favorite of backpackers, who can earn up to 9.75 miles on the trail.

(Below) Bob Burnett, a Navy veteran from Chaffee, Mo., was recognized for logging 1,800 miles in the 2013 100 Missouri Miles Challenge. The e-badge for Watkins Woolen Mill State Park and Historic Site is shown above.



looking to create a group can get started by submitting some basic information online. Some groups specialize in a particular activity while others encourage members to log all their outdoor activities.

STATE OFFICIALS EMBRACE THE CHALLENGE

In addition to tracking their own miles, the challenge allows participants to follow the governor and first lady as they enjoy trails throughout the state. Many Missourians enjoy seeing how their progress compares to others.

In 2013, State Parks Director Bryan took the challenge a step further by setting the goal to paddle 100 miles with his wife. They took to the waterways and successfully completed all 100 miles by canoe.

"We have always enjoyed the outdoors, but the Governor's 100 Missouri Miles Challenge gave us a goal to work toward," said Bryan. "It was challenging, but we also had a lot of fun."

For more information and to take the challenge, visit 100MissouriMiles.com. Participants can also share adventures, post photos and learn about upcoming events by connecting with 100 Missouri Miles on Facebook and Twitter.  

Steph Diedrick is the division information officer for Missouri State Parks.



Looking

DNR photo by Mark Gordon



(Top) Drill bits such as these are attached to 20-foot drilling rods and are capable of cutting through rock. (Above) B&H Well Drilling and Pump Service's drilling equipment is ready to begin work on an educational water well at the Missouri Geological Survey in Rolla. (Right) Crew members begin drilling the borehole and drilling rod sections are added as depth increases. Drilling rods are stored on a horizontal rack on the drill rig.



Below the Surface

Missouri Geological Survey's Educational Water Well

by Justin Davis

We depend on good quality water for drinking. For many Missourians, that water comes from a well.

Have you ever wondered how a water well is constructed? What actually goes on below ground? Is it as simple as drilling a hole? The Missouri Department of Natural Resources recently installed a demonstration water well that clearly answers these deep questions.

Located at the department's Missouri Geological Survey in Rolla, the 200-foot-deep well was constructed using clear well casing, and it may be the first well of its kind in Missouri. This well offers a unique opportunity for students, educators, well drillers and others to literally see the underground workings of a water well and to observe the interaction of well construction materials used to ensure clean, safe drinking water in Missouri.

Constructing a Well

Most water wells are drilled deep enough to intercept water from an underground layer of water-bearing permeable rock or unconsolidated materials such as gravel, sand or silt, known as an aquifer. Aquifers not only hold, but transmit significant quantities of water.

Proper construction of a well affords access to groundwater while ensuring the water is safe for use. Casing, or pipe made of PVC or steel, is placed in the upper portion of the drilled borehole to hold back loose rock and soil. The casing also provides a barrier to keep surficial bacteria and

other potential contaminants from entering the well.

"Our clear PVC is commonly used in algae farming, double containment, and a variety of industrial applications where flow indication is important," said Brian Gordon of Georg Fischer Harvel, manufacturer of the casing. "We are excited to see it used for this purpose. It's always rewarding to see new applications for our plastic piping systems."

The space between the borehole wall and the outside of the casing is known as the annulus. The annulus is filled with sealing material to prevent contaminants from moving down through the annulus and into deeper aquifers, minimizing the risk that the well will act as a conduit for surface contaminants to flow into drinking water sources. One material used to seal the annulus is grout, which typically is made of either neat cement or bentonite clay.

The Missouri Geological Survey's demonstration well has four different grout types placed in the annulus. The lowermost 60 feet of the annulus was sealed with neat cement and bentonite clay slurry. Both were positioned using a small-diameter pipe, known as a tremie pipe, that was lowered into the annulus and through which the grout was pumped. The uppermost 60 feet was filled from the surface with solid bentonite clay chips and bentonite granules, each approximately three-eighths and one-sixteenth of an inch, respectively. The water level or depth to the nearest aquifer in this well is approximately 125 feet below



DNR photo by Hylan Beydler



DNR photo by Hylan Beydler

Ensuring Clean Groundwater – It's in Our Nature



DNR photo by Mark Gordon

Clear casing is suspended above the well and lowered into the borehole.

Groundwater is a valuable resource that must be understood to ensure availability for future generations. Missouri has significant, high-quality groundwater resources. The department employs geologic science to protect critical groundwater resources from potential contaminants and safeguard its availability for current and future use.

The state's geology mostly is composed of porous sedimentary rocks like sandstone and fractured limestone and dolomite, which are capable of storing a lot of groundwater. Much of Missouri contains an abundance of fresh, drinkable groundwater available for use. Several billion gallons of groundwater are pumped from the state's geologic formations every year, and the demand likely will increase.

Missourians use groundwater for drinking, food production, cleaning, cooling, heating, manufacturing and recreation. The natural beauty of water is the central focus in many of our state parks and historic sites, and a focus area of protection for the department. Therefore, we all are invested in this vital resource.

The Show-Me State has 159,180 registered water wells, of which 133,462 are private domestic water wells. Each year, approximately 3,100 private domestic water wells are drilled. Municipalities and businesses

in the state operate more than 4,300 public wells, some supplying as much as 2 million gallons of water each day.

Protection of groundwater resources hinges on our scientific understanding of aquifers and proper construction methodologies for wells that tap those resources. Information gained from sources such as the demonstration well helps determine the effectiveness of well construction materials, and aids in establishing construction requirements that are protective of Missouri's critical groundwater resources.

The state Well Installation Board establishes construction standards for wells drilled in Missouri. The Missouri Geological Survey is responsible for protecting the quality of Missouri groundwater by ensuring well drilling contractors employ environmentally safe drilling and construction practices as set by state regulations. Staff from the Missouri Geological Survey test and license water well contractors to do business in Missouri.

Missourians enjoy the cleanest and highest quality water in decades. This year marks the 40th anniversary of the Safe Drinking Water Act and the department's 40th year protecting, maintaining and improving the quality of surface and groundwater in the state.



DNR photo by Mark Gordon

Combined with a down-hole camera, the clear casing employed in the educational water well will allow for a unique opportunity to view the inside of an operational well.

ground surface, which is common for most private water wells in the Missouri Ozarks Region. While all grout types and placement methods used in this well appear to have adequately sealed the annulus, those placed via tremie pipe more uniformly filled the annular space.

By lowering a down-hole video camera into the well, the various grout types can be seen through the clear casing. This technology allows staff to determine the ability of each grout type to seal the annulus.

"This was a unique opportunity to visualize how each commonly used grout type performs," said Greg Bonnot, B&H Well Drilling owner, Bonnots Mill, whose company drilled the well.



(Above) Geologist Justin Davis guides the down-hole camera used to inspect wells during a demonstration for Rolla Middle School students. (Right) Rolla Middle School students learn about the down-hole camera from Davis and fellow geologist Brad Mitchell.



DNR photos by Hylian Beydler




DNR photo by Hylan Beydler

Education

Students with school groups from various levels, from elementary to university, visit the Missouri Geological Survey to learn about the state's natural resources.

"Students and teachers alike enjoy seeing this unique well and learning about our role in ensuring safe drinking water," said Hylan Beydler, information officer, Missouri Geological Survey. "Water is vital to life. The demonstration well and the down-hole camera provide visitors clear insight about this precious resource."

Learn more about private water wells and locate well drillers licensed to do business in Missouri at dnr.mo.gov/geology/geosrv/wellhd/. 

Justin Davis is a geologist with the Missouri Geological Survey, a division of the Missouri Department of Natural Resources.

(Left) Story author Justin Davis, a geologist, shows Rolla Middle School students a remaining segment of the clear casing used to construct the educational well.

(Below) A down-hole camera is prepared for lowering into the well, which was constructed next to the McCracken Core Library and Research Center in Rolla.



DNR photo by Scott Myers

The Year of the Trail

by Megan Hopkins

With nearly 1,000 miles of trails for guests to enjoy, Missouri's state parks and historic sites are full of opportunities to enjoy hiking, biking, water and equestrian trails. In celebration of the state's award-winning trails, Missouri State Parks is celebrating 2014, the Year of the Trail.

"Our state park trails are the best of the best, and we are excited to celebrate that excellence with thousands of hikers, bikers, paddlers and equestrians who will enjoy our trails in 2014," said Bill Bryan, director of Missouri State Parks, a division of the Missouri Department of Natural Resources. "Right here, close to home, we have some of the very best trails in the country."



The “Year of the Trail” designation was made official by Gov. Jay Nixon with a proclamation that highlighted Missouri’s designation as the Best Trails State in the nation.

The celebration includes trail-related special events and programs as well as a new GeoChallenge on the Missouri State Parks mobile app that challenges guests to navigate to trailheads in state parks and historic sites.

Nearly 1,000 Miles to Explore

Missouri State Parks offers a blend of geological formations that create a unique combination of trail types across the state. No matter where in Missouri, guests can experience an exciting trail adventure. Each trail also has updated mapping and signage, and in some cases, interpretive information or programs for education. These options encourage visitors to experience the full quality of the trails.

There are trails throughout the state that are perfect for people of all interests. Kelley Brent, trails planning coordinator for Missouri State Parks, recommended guests look into the many different types of trails that state parks offer and pick a trail to best suit their preferences and capabilities. From backcountry backpacking trails to paved trails, finding a trail to suit your abilities is important when planning a trail adventure.

There are many reasons to get out on a trail, including fitness, enjoyment and activities, such as bike or equestrian riding, bird watching, wildlife viewing, backpacking or camping.

“A trail adventure is an excellent way to reconnect with nature, yourself and others,” said Brent.

(Opposite page) The Braille Trail at Elephant Rocks State Park offers a great opportunity for guests of all skill levels to hit the trail.

DNR photo by Ben Nickelson

(Top) Hawn State Park is full of hiking and backpacking trails that showcase the diverse natural landscape of western Ste. Genevieve County.

(Right) The Boardwalk Trail at Pershing State Park is perfect for a family outing to learn about the wetland biodiversity that was once common in northern Missouri.



DNR photo by Scott Myers



DNR photo by Scott Myers

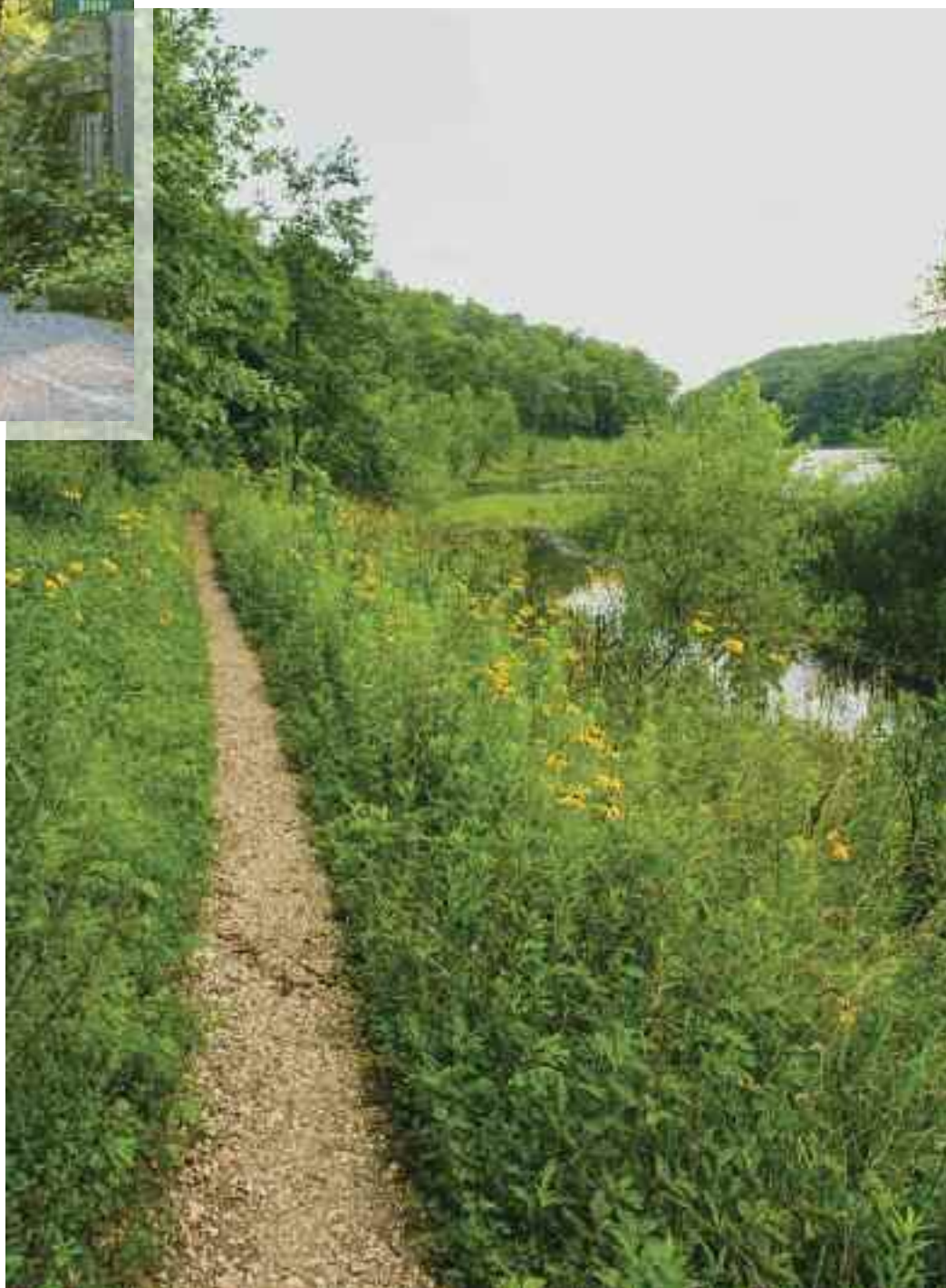


DNR photo by Scott Myers

Missouri State Parks staff have worked hard to create materials that are useful to guests and maximize their experiences. A great way to fully enjoy all the trails have to offer is to get *Trails of Missouri State Parks*, which is a detailed overview of the trails in 58 state parks and historic sites.

“It is a comprehensive publication that includes all of our trails, maps and trail information, including a summary of each trail with a map that includes contour lines, GPS coordinates for trailheads and outstanding features like overlooks,” said Brent. The book also explains “the new standards of how we categorize and communicate our trail information.”

Trails of Missouri State Parks has won two national awards praising the efforts to educate and communicate with park guests



DNR photo by Scott Myers

(Top) Stretching 240 miles across the state, Katy Trail State Park offers opportunities for half-hour strolls or five-day bicycle journeys.

(Right) A short drive from St. Louis, Cuivre River State Park is great place to head for a full day on the trails.



DNR photo by Ben Nickelson




DNR photo by Scott Myers

about all that Missouri trails have to offer.

Since 2005, Missouri State Parks has added 205 miles of trails to the system, making it even more enjoyable for hikers to be outdoors. The trails system is constantly growing to include more options for exploring the outdoors in a safe way.

“Spending time outdoors makes us happier and healthier, and with the best trails right here in the Show-Me State. We want Missourians to get outside and hit the trail in a state park or historic site close to home,” said Bryan. “They’ll be glad they did.”

To find out more about trails in Missouri State Parks, visit mostateparks.com. 

(Above) Taking the trail at Battle of Pilot Knob State Historic Site is a fun way to explore Missouri’s storied Civil War history.

(Left) Meramec State Park has seven trails on which guests can enjoy the pristine beauty of the Meramec River and its surrounding bluffs, caves and forests.

Megan Hopkins was a summer intern with Missouri State Parks.



Rural Missouri photo contest winner

Fall events throughout Missouri state parks offer the opportunity for kids to have a fun outdoor experience. (Bottom) Live bird programs are among the fall programs available to Wallace State Park guests.

Fall in Missouri Parks

by Megan Hopkins

Fall campouts, nature programs and haunted hikes are among the events guests can enjoy in Missouri State Parks this October. Fall is becoming one of the most popular seasons for guests to visit Missouri's state parks and historic sites, and there are a variety of events for guests to enjoy. Here are some ideas for guests looking to celebrate Halloween and enjoy fall.

Johnson's Shut-Ins State Park

Johnson's Shut-Ins State Park, near Lesterville, is a Halloween favorite for guests and locals in the community. On Oct. 25, they will host Halloween Happenings, a vaudeville-style program that includes songs, jokes and skits. The program will start at 7 p.m., and will be followed by a time for kids to meet the Creatures of the Night.

"We have something for all ages, from jokes for the little kids to comments that will pique the interest of the adults. And we want the event to be fun, not scary for the kids," said Janet Price, park interpreter.

The program will be held at the Black River Center. Some hay bales will be provided for seating or guests can bring their own lawn chair.

Watkins Mill State Park and Historic Site

In the fall, Watkins Mill State Park and Historic Site, located in Lawson, is popular with visitors and is a great place to take photos and camp.

"The park is very beautiful with the fall colors," said

Mike Beckett, facility manager.

Making fall even more fun at Watkins Mill State Park and Historic Site this year is a new event, the Halloween Campout on Oct. 25. The campout will include two contests for the spookiest campsite, and K-9 costumes, spooky nature program, and campsite trick-or-treating. Guests are invited to bring candy to pass out to the trick-or-treaters, and guests, especially kids, can wear costumes if they want.

To participate in the campout, reservations are preferred, and normal camping fees will apply. The event will start at 5:30 p.m., and campers can make reservations by calling 877-422-6766.



DNR photo by Lana Woody

Wallace State Park

Wallace State Park is less than an hour from Kansas City, and is a serene escape from city life. Making fall even more special at the park is some Halloween fun.

On Oct. 25, guests can enjoy campsite decorating and pumpkin carving contests at the park. There will be treats available throughout the evening, and prizes will be awarded to the winners of the contests. The event is from 7-10 p.m. at the park's amphitheater, and guests are able to view the decorated campsites until 10 p.m.

Crowder State Park

In the fall, Crowder State Park, near Trenton, has "colorful leaves and cool evenings," said Anna Purcell, park superintendent, making it a good time of year to enjoy more than 17 miles of hiking, biking, and equestrian trails.

On Oct. 31, guests can take a Halloween Night Hike through the park, at 6 or 7 p.m., and then enjoy crafts. The 6 p.m. hike is a nature hike, so guests are able to view the fall scenery. The 7 p.m. hike is a "haunted" hike. Both hikes are for all ages. Guests should arrive just before the time they plan to hike.

Ha Ha Tonka State Park

The fall atmosphere surrounding Ha Ha Tonka around the Lake of the Ozarks is beautiful, with the ruins of a turn-of-the-20th-century castle surrounded by fall colors, and the park does even more to dress for Halloween. Camden-ton Elementary School students provide jack-o-lanterns they have carved to help set the mood along the scenic Castle Trail.

On Halloween, guests can participate in the Ha Ha Haunt from 5-8 p.m. Visitors can dress up and hike the Castle Trail. Upon reaching the castle ruins, they will receive a treat bag, make s'mores, enjoy hot chocolate, crafts and play games for prizes.

"We put out tons of fun and spooky decorations," Larry Webb, a park interpreter, said, "but we don't scare anyone."

This is the 23rd year for the free event, which allows visitors to come and go throughout the three hours.

To find out more about any of these events or see what is happening at a park or historic site near you, visit mostateparks.com.

Megan Hopkins was a summer intern with Missouri State Parks, a division of the Department of Natural Resources.

(Top) Everyone loves s'mores, especially guests at the Ha Ha Haunt at Ha Ha Tonka State Park.

(Right) Ha Ha Tonka State Park offers several scenic vistas that make it a beautiful place to visit in the fall.



DNR photo by Jodi Moulder



DNR photo by Scott Myers

Table Rock State Park Makes Top 100



Table Rock State Park has been recognized among the Top 100 Family Friendly Places to Boat and Fish in the U.S., by Take Me Fishing, earning the ninth spot on the list. The Take Me Fishing campaign was initiated by the Recreational Boating and Fishing Foundation in order to create a list for families and outdoor enthusiasts of the best family-friendly places to boat and fish.

The park's marina, State Park Marina, was also recently designated as Missouri's first "Clean Marina." This voluntary enrollment program by Ozarks Water Watch and the Missouri Stream Team Watershed Coalition is being piloted on Table Rock Lake, and is funded in part by the Missouri Department of Natural Resources and

Table Rock Lake Marina Association. Table Rock State Park, located six miles west of the Hollister exit on Taney County Road 165, offers camping areas with easy access to the water, hiking and mountain bike trails and a range of shelters and picnic areas that help make the park the ideal place for playing in and around the lake's clear waters.

Earth Science Week 2014

To be held Oct. 12-18, Earth Science Week will promote awareness of the dynamic interactions of the geosphere, hydrosphere, atmosphere, biosphere and human systems. "Earth's Connected Systems," this year's theme, engages young people and others in exploring the numerous ways geoscience illuminates natural change processes.



On National Fossil Day, Oct. 15, visitors to the Missouri State Capitol can examine fossils embedded in the building's limestone walls, floors and stairs. Visitors to the Ed Clark Museum of Missouri Geology, in Rolla, will receive a small Crinoid fossil (Missouri's official state fossil).

Join millions Oct. 16 at 10:16 a.m. during the Great Central U.S. Shake Out to practice the "Drop, Cover, and Hold On" earthquake drill.

Geologic Map Day will be held Oct. 17 to promote awareness of the study, uses and importance of geologic mapping for education, science, business, and public policy concerns.

On Oct. 18, a Missouri Geological Survey staff geologist will host an educational booth at the Gem and Jewelry Show, held at the Expo Center in Springfield and sponsored by the Ozark Mountain Gem and Mineral Society.

Learn more at dnr.mo.gov/geology/education.htm.

Time Exposures

Sandy Creek Covered Bridge is one of four remaining historic covered bridges in Missouri. Built in 1872, it was one of six bridges built to link the Jefferson County seat of Hillsboro to St. Louis. The bridge was built using the Howe-truss design, which was named for and patented by William Howe in 1940. Three of the four remaining historic covered bridges in Missouri also use the distinctive Howe design.

This photo, taken around 1913, was shot by Charles Trefts, a St. Louis photographer who left a record of over 60 years of photographs of buildings, street scenes, parks, churches, and even catastrophes. His photos were mostly taken in the St. Louis area, but he sometimes chose rural Missouri for his work.

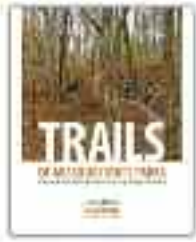
Look closely for the a little girl, probably a Trefts family member, standing on the left side of the bridge wearing a bonnet. An even closer inspection shows that the automobile parked in the middle of the bridge has two American flags attached to the front of the vehicle. While we don't know exactly why the flags were there, it is believed that the Trefts family was possibly on a vacation trip for the 4th of July and stopped to make this photograph along the way. To view more of Charles Trefts' photographs, visit the State Historical Society of Missouri's online database at statehistoricalsocietyofmissouri.org.



Send your photo to "Time Exposures," c/o Missouri Resources, PO Box 176, Jefferson City, MO 65102-0176. Original photos will be returned via insured mail. Pre-1980 environmental and natural resource photos from Missouri will be considered. Please try to include the date and location of the picture, a brief description and any related historic details that may be of interest to our readers.

Trails of Missouri State Parks Recognized

The Coalition for Recreational Trails has awarded Missouri State Parks with the 2014 Annual Achievement Award for *Trails of Missouri State*



Parks, a book detailing the many trails in state parks and historic sites. The award recognized the project as an outstanding use of Recreational Trails Program funds in the category of Education and Communication, and was accepted in Washington D.C., by U.S. Rep. Lacy Clay on behalf of Missouri State Parks.

The Annual Achievement Award is part of an ongoing effort by the Coalition for Recreational Trails to build awareness and appreciation for the Recreational Trail Programs. The award in the Education and Communication category specifically honors projects that enhance trail use and enjoyment through increased environmental awareness, promotion of trail-related safety, and encouragement of trail-related outdoor recreation.

Trails of Missouri State Parks began in 2008 as part of a project to inventory and manage the trails in state parks. The publication is a 422-page, full-color book that lists detailed information about the trails found in 58 state parks and historic sites.

Natural Resources Award of Excellence

The future of Missouri's natural resources depends on the efforts of every community, business, organization, farmer and citizen. Many innovative Missourians are leading the way in the protection and enhancement of our natural resources. Their actions deserve the highest recognition.

In honor of the Department of Natural Resources' 40th anniversary, the department is accepting nominations for its very first Natural Resources Award of Excellence. The awards are

designed to recognize leadership and innovation in managing our state's natural resources. Award categories include: Community/Local Government; Small Business and Industry (up to 200 employees); Large Business and Industry (more than 200 employees); Institution/Public Sector Facility or Educator; Agriculture; and Service/Civic/Nonprofit Organization.

Help the department recognize Missouri's natural resource stewards who are creating new technologies, reducing wastes, establishing educational programs and much more to help

care for our environment. To learn more about the Natural Resources Award of Excellence, categories and nominations, visit the department's website at dnr.mo.gov/governor-conference.htm. Nominations must be submitted by Oct. 6, 2014.

For news releases on the Web, visit dnr.mo.gov/newsrel.

For a complete listing of the department's upcoming meetings, hearings and events, visit the department's online calendar at dnr.mo.gov/calendar/search.do.

Looking for a job in natural resources? Go to dnr.mo.gov/hr.

OUR MISSOURI WATERS

Spring River Proud

The Spring River Watershed Partnership is "Spring River Proud." This motto aptly describes the dedicated, community-based volunteer group that answered the call to protect their local watershed near Carthage, in Jasper County.

After a local Stream Team sampling found high levels of bacteria in 2005, the Jasper County Health Department began to assist with the sampling to better understand the water quality problem. They, too, wanted to ensure a healthy stream for the many citizens that use it for fishing, swimming and boating.

Local citizens then swiftly formed the Spring River Watershed Partnership. By 2010, the partnership formed a board, drafted a watershed management plan and secured funding to implement practices aimed at reducing sources of bacteria.



Brett Nichols photo

The Spring River Watershed Partnership educational booth at Kids Fishing Day on Kellogg Lake, June 2013.

To date, the partnership has marked over 200 storm drains with wording that says, "No Dumping," and, "Drains to Spring River." This reinforces the message that storm drains, no matter where they are located, are for storm water – nothing more. The group also installed a demonstration rain garden, sponsored a rain barrel cost-share program and provided educational information throughout the watershed.

The partnership is truly making the watershed citizens it serves "Spring River Proud!" This is a shining example of teamwork displayed every day by local citizens to protect, preserve and enhance our Missouri waters.

To learn more, visit springriver.jaspercounty.org and dnr.mo.gov/omwi.htm.



Top Spots to Mountain Bike

Mountain biking is a unique way to get outdoors and enjoy nature, while having some fun and even getting in a good workout.

There are 14 state parks and historic sites that feature trails that are great for mountain biking. If you're looking for a mountain biking adventure, make sure to check out the trails at Finger Lakes, Stockton, Thousand Hills and Lake Wappapello state parks.

Kelley Branch Mountain Bike Trail at Finger Lakes State Park is a 2.75-mile trail along the Kelley Branch stream through wooded landscape, including a waterfall. Riders experience a natural surface, and may also experience steep grades and inclines of more than 10 percent, physically challenging obstacles, bluffs or drop-offs next to the trail and water/stream crossings without bridges.

Lakeview Trail at Stockton State Park is an 8-mile trail running through young woodlands, as well as more mature oak and hickory trees. Riders are able to take a break at the beach, which is right along the trail. Riders at Stockton also can ride the Umber Ridge Trail, which is 1.75 miles. Riders experience a natural surface, and also may experience a road or highway crossing.

Thousand Hills Trail at Thousand Hills State Park is a 10.5-mile trail through hilly, rugged, wooded terrain passing through savanna restoration units and Forest Lake. Riders experience a natural surface, and also may experience steep grades and inclines of more than 10 percent, as well as water/stream crossings without bridges.

Lake Wappapello Trail at Lake Wappapello State Park is a 12.75-mile trail through varied and rugged Ozark terrain with shoreline views and a host of wildlife viewing opportunities. Riders experience a natural surface, and also may experience steep grades and inclines of more than 10 percent that feature physically challenging obstacles.

Visit mostateparks.com to learn more about mountain biking in Missouri State Parks.



DNP photo by Scott Myers

(Above) Finger Lakes State Park offers a 2.75-mile trail for those craving a mountain biking adventure.

(Below) Mountain biking in Missouri's state parks is a great way to enjoy the outdoors while getting a great workout.



DNP photo by Ben Nickelson



(Left) The River Landing Trail begins on a winding path with panels of information about wildlife, vegetation, and history along the trail. (Below) As visitors make their way to the end of the trail, a wooden walkway leads them over an old river channel and onto the Lewis and Clark Trail of Discovery. The Trail of Discovery meets the Missouri River one-half mile to the south.

River Landing Trail

Arrow Rock State Historic Site

photographs by Andrew Richmond



At one time, the river landing was the hub of Arrow Rock commercial activity and the site of several warehouses. By 1860, the Arrow Rock landing was one of the busiest river ports between St. Louis and Kansas City. Remnants of an old wagon road are visible adjacent to the trail.

Following the record floods of 1993 and 1995, the area began revert-

ing to bottomland forest and wetlands. Interpretive signs explain the history of the landing, cultural features such as the former warehouse sites and boat building yard, and the natural processes that are now occurring in the area.

The trail passes a portion of the bluff from which Native Americans extracted flint to make their tools and points, giving Arrow Rock its name. Beaver, otter and wading birds – or signs of their activity – are frequently visible in the old channel.

River Landing Trail was constructed in 2007 as a joint project of the United States Fish and Wildlife Serv-

ice, the Department of Natural Resources and the village of Arrow Rock, with grants from the National Park Service. Ongoing maintenance is carried out by the Manitou Bluffs Chapter of the National Lewis and Clark Trail Association and the Friends of Big Muddy. The trail links the historic site to the 1.6-mile linear Lewis and Clark Trail of Discovery on the Jameson Island Unit of the Big Muddy National Fish and Wildlife Refuge.



*Missouri State Parks – a division of the
Missouri Department of Natural Resources*

Rock Matters

Granite

Granite is one of the oldest rocks exposed in the state. An intrusive igneous rock, granite cooled slowly and solidified from a large body of hot liquid magma beneath the surface of the Earth's crust, surrounded by pre-existing rock.

(Right) Primary minerals in Missouri Red Granite are potassium feldspar and quartz. DNR photo by Mark Gordon.

(Bottom right) This large lichen-adorned granite boulder is an appropriate grave marker for the late Henry A. Buehler, state geologist of Missouri for 36 years. DNR photo by Hyland Beydler.



The word "granite" comes from the Latin word granum – a grain – in reference to its coarse-grained structure. Missouri granites contain large amounts of the minerals quartz and feldspar. They also contain lesser amounts of plagioclase, hornblende, biotite, muscovite, chlorite and epidote. The specific amounts of these minerals vary, depending on the particular granite. Many of the granites contain trace amounts of sericite, sphene (titanite) and fluorite.

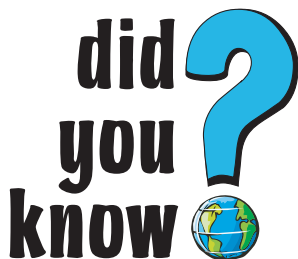
Granite may range in color from white, tan, brown, red and gray, but pink and red granites predominate in Missouri. Fine-quality granite is abundant in the southeastern part of the state, particularly in Iron, St. Francois, Madison and neighboring counties. It has long been quarried for building, structural, and monument purposes, as well as for countertops, riprap, ballast, crushed aggregate, paving blocks, landscaping and other specialized uses.

Graniteville granite, also known as "Missouri Red," has been mined from Iron County for more than 150 years. Missouri Red and other Missouri granites have been used in monuments and architectural projects across the nation and around the world. Eight large columns of polished granite from Graniteville reside inside the Missouri Capitol and the Governor's mansion entry consists of an imposing portico with four dignified pink granite columns. Other notable structures include the Eads Bridge footings in St. Louis; the Adolphus Busch Memorial at Bellefontaine Cemetery and Anheuser-Busch Brewery buildings in St. Louis; the Thomas Allen Monument

(named for Allen, elected to the U.S. House of Representatives from Missouri in 1881); a 42-ton obelisk, made from a single piece of granite, in Pittsfield, Mass.; and the Clarence F. Buckingham Memorial Fountain in Grant Park, Chicago.

Granite often is found in rounded outcrops created by weathering that is best exemplified by the giant elephant-shaped boulders at Elephant Rocks State Park in Graniteville. These "elephants" lie at the core of the Ozark Mountains and provide us with a rare glimpse of Missouri's volcanic past. They are popular with history buffs who like to read the names of the 19th-century miners who used to work in the area and who carved their names into rocks, children who love to climb and scramble over and through the rocks, and parents who revel in taking pictures of their children pretending to push the rocks.

Crushed granite and monumental dimension stone comprise nearly all of Missouri's entire granite production. The demand for Missouri Red and other monumental granites likely will not decrease in the future. The growing use of crushed granite secures a promising future for granite production in Missouri. Learn more at dnr.mo.gov/geology/.



One Quart of Oil Goes a Long, Long Way

Did you know the used oil from one oil change has the potential to pollute one million gallons of water if disposed of improperly? Apply this figure to the estimated 200 million gallons of used oil improperly disposed of by do-it-yourself mechanics annually, and the potential environmental damage is staggering.



When oil is recycled it is cleaned of contaminants such as dirt, water, oil additives and heavy metals. Once cleaned, oil can be treated and re-refined into a host of lubricating oils, including motor oils, for use in your car. Since the natural lubrication properties of oil don't wear out, this process can be repeated indefinitely.

If you are a shade tree mechanic, take care to use a drip pan to catch all used fluids, don't dump or spill oil on the ground and absolutely do not pour it into a storm drain. The best course of action is to collect any used oil (don't mix with other waste fluids) in a plastic container with a tight-fitting lid and take it to a service station, an oil collection center, or an auto parts store for recycling. Stores like AutoZone, O'Reilly, Advance, and Walmart have used oil collection programs. The service is free, but check with your local store first to make sure it participates.

Being a Good Neighbor

by Renee Bungart

photograph by Andrew Richmond



Living life in a small town has many advantages for the families that call them home. I grew up playing outdoors, building forts in the woods, exploring nearby creeks and quenching my thirst straight from the garden house or well pump. Cheering on the local hometown team – regardless whether your family played in the sport – was always a great way to spend time with the neighbors.

I have shared these same experiences with my children and hope they will continue to witness the joys this type of life can bring to its residents. As adults, however, we begin to realize that living in a small town can also become crowded by disadvantages that are often difficult to tackle due to lack of resources.

The city of Ewing is no exception to this situation. For this reason, Mayor Linda Lueckenhoff reached out to the Department of Natural Resources to seek assistance for their small community of 456 residents.

Many of Missouri's small communities face the need to repair or replace water and sewer infrastructure. It's not a surprise. Larger communities face this same challenge. However, small communities often need help with the technical, managerial and financial resources to address these infrastructure challenges.

"Proper handling of wastewater benefits the community by keeping the environment safe and healthy for all who live in the area, and maintaining our natural resources, including wildlife," said Mayor Lueckenhoff. "It also helps this community be a pleasant place to live."

Because many of these small communities are home to fewer than 1,000 residents, paying for engineering, construction and maintenance of drinking water and wastewater systems can be costly to divide among limited households. The department awarded a \$21,600 Small Community Engineering Assistance Program grant to

Ewing to evaluate necessary upgrades to its wastewater treatment and collection systems.

"The grant will benefit every household connected to the sewer system by offsetting some of the cost of this project. Money we do not have to spend on engineering costs will be put toward the construction phase of the project. We are making every effort to spend the citizens' money wisely," added Mayor Lueckenhoff.

The department is implementing an effort called Community Services. It focuses on the needs of small communities, like

Ewing, by providing grants, loans and technical assistance. In addition, the department is partnering with the Regional Planning Commissions, Missouri Public Utility Alliance, Missouri Rural Water Association and others who offer specific services, skills and specialized equipment to help Missouri's smaller communities.

The department's Community Services efforts are bringing the necessary resources to small communities to figure out the best solutions to address their environmental challenges. I guess you could say – we're trying to be a good neighbor. To learn more, visit the Web at dnr.mo.gov.

Renee Bungart is deputy director of communications for the Department of Natural Resources.

Linda Lueckenhoff, mayor of Ewing, hopes sewer infrastructure improvements in her town will improve conditions for the 456 residents she serves.

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J. Huston Tavern

Step back in time to Arrow Rock's frontier heyday when you dine at the J. Huston Tavern at Arrow Rock State Historic Site. The tavern is the oldest continuously serving restaurant west of the Mississippi River with 180 consecutive years of service to the public.

Enjoy a meal of award-winning fried chicken or stop by the ice cream shop for a quick treat. Visit jhustontavern.com for hours of operation and make sure to check out upcoming special events.

